# 40. A Revision of the Isopod Genus Ligidium (Brandt)* -Crustacea. By Harold Gordon Jackson, F.Z.S., Birkbeck College, University of London. 

[Received July 13, 1923 : Read November 6, 1923.]
(Text-figures 1-10.)
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(1) Introduction.

The genus Ligidium was separated from Ligia by Brandt in 1833 with this diagnosis: "Articulus appendicis caudalis apicalis exterior articuli basalis apici interius autem processui proprio ex articuli basalis apice prodeunti insertus." It is well defined in structure aud habitat from Ligia, although nearer to that genus than to any other Terrestrial Isopod and linked to it by the nowly-described genus Ligidioides Walnberg (1922); and there is but slight range of structure within it. Budde-Lund (1885) gives five species which he describes in Latin with the utmost breviiy and without figures. The most important and indeed often the only character given is the form of the uropod, but as the appendage is brittle and often lost, it is sometimes impossible to make a certain identification from his description. I only retain two of these species, but several good species have been added since Budde-Lund's work, and his collection contains specimens, mostly unidentified by him, which have enabled me to describe all but four species. The revision of this genus has been greatly aided by a recent paper by Verhoeff (1918) dealing with the European species, in which much-needed new characters are proposed, and a new subgenus, Typhloligidium, is set up, on, to my mind, amply sufficient grounds, to contain Carl's cave-dwelling Ligidium coccum.

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## (2) Generic and Specific Characters.

I have not found any marked sexual dimorphism to occur in Ligidiam, the difference between the sexes being confined to the modified pleopods of the male. In some species of Ligia the sutures separating coxal plates from tergite are differently manked in the sexes. It is interesting to note that no such difference is to be found in this genus, and that the sutures are marked, if at all, in an entirely different manner by fine semicircular grooves on the last four thoracic somites of both sexes (text-fig. 7, a).

The proportions of the body and the size vary remarkably little.

The colour of preserved specimens is of little value, but the distribution of the pigment is sometimes chanacteristic and always worth noting.

The general surface of the body is remarkably smooth and polished in all but two species, which havo a roughened appearance owing to the presence of scales or knobs.

Cephalon. The line of the epistome is continuons. Aloove and between the insertion of the antenne it forms a downwardlydirected $V$, which differs in length and sharpness in different species. When prolonged and sharp it commonly projects forward to form a slight triangular rostrum. This condition is termed "produced" in the following descriptions (text-fig. 7, $b$ ). The eyes are moderately large in all species of the subgenns Ligidium, and occupy the lateral corners of the head. In front. of the hind margin of the cephalon is a more or less deep trench ("transverse groove"), opening to the cheek more or less behind the eye on each side. The two pear-shaper pits on the forehead of Lifia are represented in this genus by grooves ("frontal grooves") which originate behind the eyes in the transurse groove, run forwaits on the inner side of the eyes, and turn inwards on the top of the head to run towards each other parallel to the transverse groove. They never meet in the mid-line, but end abruptly. The demarcation of these grooves has some systematic value. (Text-figs. $3, b ; 7, b$.)

The thoracic somites vary little in general form. The hind margins of the first three are more or less straight, the fourth is slightly concave, and the remainder more deeply so owing to the backward production of the lateral corners. These are never, however, much produced. The first somite usually differs from the remainder, as las been pointed out by Verhoeff' (1901). In many species the tergite is dinted on the postero-lateral corner of each side, and the dint may take the form of a wide shallow pit or of a shallow groove forming a "re-entrant" from the hind border of the tergite (text-fig. 3, $c \& d$ ). In either case it superficially appears as if the tergite had been carelessly nipped by a fine pair of forceps. This structure is referred to hereafter as the "lateral depression." When the depression is extencled to
the hind border of the tergite, there is often present on its hind eilge a patch of stiff bristles arranged in about three transverse rows, forming, as it were, a thick fence of stakes at the entrance to the little valley. Verhoeff (1918) has suggested that this appantus may be used as n comb for cleaning the antenme, but confirmatory observations have yet to be made.

The edges of the tergites are beset with "Schuppenborsten" similar to those of Ligia, as described by Wahrberg-that is to say, the bristle usually projects slightly, but never conspicuously from the scale; it is sometimes not easy to cletect.

The abdomen (netasome) is always abruptly contracted. The first two somites are covered by the last thoracic somite, and are without diawn-out pleural plates, but the remaining somites have these moderately drawn out. The terminal somite is very similar in form in all species. The hind border is arcuate or very bluntly angled in the median line; it is notched above the insertion of the mropods to a greater or less extent in different species, but no distiactive angles or spines are developed.

## Appendages.

The antemace (antennules) are of three segments, the distal of which is almost restigial. They always project beyond the front of the head in this genus. Sensory. bristles are found on each segment and a terminal bunch on the last of a few short stiff roils. ('lext-fig. 2, a.)

2nd antennce. Five segments and an obscurely segmented flagellum of not more than 15 or less than 9 segments, ending in a dense brush of seta. In the subgenus TYyphloligidium the tlagellum has 19-23 segments. The number of segments on the flagellum appears to increase in number till fully adult. ('Text-fig. 2, b.)

Right mandible. Three strong biting teeth; large lacinia mobilis beset with many strong bristles, but not chitinized; 3 hairy setre between biting teetli and molar tubercle on base of lacinia mobilis. Molar tubercle not high-crowned, and bearing a dense row of setose bristles on its free posterior edge. A bunch of long non-setose bristles between lacinia mobilis and molar tubercle. ('lext-fig. $1, a \& c$.)

Left mandible. Three or four strong biting teeth; lacinia mobilis with 3 chitinized teeth; 3 or 4 hairy bristles between biting teeth and molar tubercle on base of lacinia mobilis. Molar tubercle high-crowned; its surface strongly ridged. (Text-fig. $1, b \& d$. )

1st maxilla. Lacinia exterior with 4 large teeth and 3 or 4 small ones. Lacinia interior with three very stout hairy bristles, the two inferior of which are equal and larger than the uppermost one. (Text-fig. $1, e \& f$.)

2nd maxilla. Obscurely divided into two lappets, the smalleron the outer side; on the inner side are seen two richly setose
bristles, the upper of which is small and rommerl, the lower larger than the upper and blade-shaped. ('Text-fig. 1, \%.)

Maxillipedes. Endopodite distinctly divided into j segments, the distal one ending in a blunt cone; on imer side of all but proximal one a prominent bunch of about 7-9 hristles. The

Text-figure 1.


Ligidium hypmorum, a\&e, right maudible; $b \& d$, left mandible; o d ff, 1st muxilla; $q$, 2nd maxilh ; $h$, mavillipede.
inner blade densely covered with plain and setose bristles on the apex. ('I'ext-fig. 1,h.)

Perceopods. 'Iypical in form and without distinctive features. The bristles are of simple form, ending in two spikes with a median small "hair." A single bristle projects beyond the
unguis in all species but L. japonicum, in which, according to Verhoeff, the 7 th foot has four ciliated bristles projecting beyond the unguis.

Pleopods. In the male the 1st and 2 nd pairs are modified. The 1st endopod is drawn out on the inside into a process upon which is set a variable but small number of setre. The 1st exopod has also setfe on the postero-median corner. The 2 nel endopod is of two segments and greatly elongated. The inner edge is thickened, and the outer appears to be folded over in some forms. At the enrl of the distal segment this fold sometimes becomes a wide lappet, which shows considerable individual variation in size and shape. Verhoeff bases a key on the characteristics of the male pleopods, but although my material is not conclusive, I do not feel disposed to allow much importance

Text-figure 2.


Ligidium hypnorum. $a$, antenna; $b$, antemule.
to them. I suspect that they appear different in forms collected during and out of the breeding-season. (Text-figs. $3, e ; 4, a \& b$; $6, d, e \& f ; 8, c \& d ; 10, c \& d$.

Uropods. The striking inequality of the two rami and the cliaracteristic inner process of the base make these appendages systematically valuable, a fact which causes their brittleness to be all the more regrettable. Budde-Lund divides the species dealt with by him into two groups-the first in which the exoporl is longer than the endopod, and the second in which the reverse is the case. Further knowledge has shown that the first group contains but two species-the common L. hypnorum and Typhloligidium cocum,-and that all the other known forms fall into the second group. The grouping does not seem to be of primary importance. (Text-figs. $4, c ; 6, g ; 8, c ; 9, c ; 10$, e.)

## (3) Kiey to the genars Ligidium.

The diagnoses of the genera Typhloligidiam and Ligiditum s.s. are taken from Vorhoeft (1918) with one omission.
A. Eyes and bedy-pigment absent. Antemal flagellom $19-23$ segments. Mandibles with large interval between the biting teeth mod triturating part; in intervening space 10-11 laniry bristles. Uropods widely separated.
Sulgenus Typhloligidium Verh. One species, 'T. сесиm (Crimea-caves).
13. Eyes large, body-pigment well developerl. Antemal flagellum 10-15 segments. Mandibles with 3-5 hairy setæ, their biting teeth and triturating part not widely separated. Subgenns Ligicliam Verlı.
\{ With bristle group on hind lateral border of 1st

1. $\left\{\begin{array}{r}\text { somite .............................. } \\ \text { Without bristle group. }\end{array}\right.$
2. $\{$ Witl lateral depression on hind border of 1 st somite
3. $\{$ Withont lateral depression

4. Endupod of uroped longer than exopod
5. $\{$ lixopod longer than endopod
6. \{ Frontal groovos deep and distinct

\{ Irrontal grooves alsent or very shanllow
\{ Surface reugh und senly
\{Surface smooth and shining
(Immer process of propodite of mropod shorter than
7. $\left\{\begin{array}{l}\text { breadth of base ........................................ } \\ \text { Inmer process longer than breadth of base }\end{array}\right.$
...........
8. $\left\{\begin{array}{l}\text { Endopod less than one-sixth longer than exopod... } \\ \text { Findopod abont half as long again as exopod } \ldots . .\end{array}\right.$
9. 
10. 

germanicum (Central
nothlosum (Cancasus). 4.
hypmorum (Enrope).
bosniense (К. Bosnia).
fircuile (Cameasus).
lalam (Cinlifornia). 7.

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joponicum (Japan).
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joponicum (Japan).
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gracilc (California).
longicaudatun (New
(4) The genus Ligidium.

The diagnosis given below is modified from Sars (1899).
Body oblong oval, moderately convex, attemated behind. Cephalon without later:al lobes. Mesosome with coxal plates marked off from tergite by faint semicircular grooves on last four somites. Metasome moderately small and abruptly contracted, without produced postero-lateral angles on last somite. Eyes large and compound. Antennula of 3 segments, small, distal segment rudimentary, but distinctly projecting in front of head. Antenna with multi-articulate flagellum of 10-15 (Ligidium) or 19-23 (Typhloligidium) segments. Mandible with lacinia mobilis and 3-5 (Ligidium) or 10-11 (Typhloligidium) setose bristles between it and the molar tubercle. 1st maxilla with 3 stont setose bristles on interior lacinia. 2nd maxilla membranous, with 2 stout setose bristles on inner side. Maxillipede with endopod of 5 distinct serments; inner blade linguiform and setose. Legs very slender and greatly increasing in length posteriorly. Opercular plates of pleopoda very thin, without any obvious branchial structure. Uropoda morlerately large, base produced on inner side into a process npon which the endopod is set; endopod usually longer and more slender than exopod and provided with 2 long and slender apical bristles.

Text-figure 3.


Ligidium hypnorum. $a$, head from front; $b$, head from above; $c$, 1 st tergite, lateral edge; $d$, 1st and 2nd tergites from side $; e$, 1st pleopod, $\delta$.

1. Ligidium hypnorum (Cuvier). (Text-figs. 1, 2, 3, 4.)

Oniscus hyprovrum Cuvier, 1792, p. 19. Ligidium personii 13r:undt (183:3), p. 173. Ligia melanocephala Koch (1847), H. 22 (162), 18. Zia melanocephala Koch (1847), Zusanmenstellung, 1. 212. Z. paludicola Koch (1847), H. 34 (180), 21. Liyidium amethystium Schöbl (1861), p. 311. L. hypnorum Stuxberg (1875); Budde-Lund (1885), p. 254 ( $q$. v. for other references). L. cursorium Budde-Lund (1885), p. 256 . L. hypnorum Michaelsen (1897), p. 132; Sars (1899), p. 157 ; Verhoeff (1901), p. 40. L. melanocephala Koch (1901), p. 69. L. hypzorum Koch (1901), p. 69; Richardson (1905), p. 686 ; Verhoeff (1918), p. 114; Dahl (1916\& 1917).

Length : đ 6 mm ., \& $7 \cdot 5 \mathrm{~mm}$. Breadth : ot $2 \cdot 5 \mathrm{~mm}$., $\$ 3.5 \mathrm{~mm}$. Seriface smooth and shining. Head. Frontal margin. slightly
sinuate; median V very obtuse and almost linear, not produced. Transverse groove deep and passing behind eyes. Frontal grooves well marked, joining transverse groove at oltuse angle behind eyes. Eyes large and pear-shaperl. Thoraa. lst somite with deep lateral depression on each side, extending to hind borter, On hind boriler of depression a dense bristle group. Coxal plates: sutmes well marked on last four somites in both sexes; moderately drawn backwards on last three somites. Antennal flagellum reaching back as far as hind margin of 2 nd thoracic somite; with 11 segments. Uropods. Inner process of base long, curved, and nearly as long as base. Endopod by itself not more than half exopod; combined with inner process reaching nearly as far, or as far as, but not beyond, tip of exopoch. Exopod abont three times as long as imer process. T'elson arenate ; not notched or only faintly notehed over uroporls.

Pleopods of $\delta^{\sigma}$. 1st exopod with 2 or 3 large seta; 1st endopod drawn out internally into long narrow process with 3 large
'l'ext-figure 4.


Ligidium hypnorum. a, End pleopod, $\delta$; $b$, endepod of same from another specimen; $c$, wropol from above.
bristles; terminal segment of 2nd endopod with rounded or almost triangular lappet.

Colour. Brown and yellow mottled. Dark more or less continuous band over junction of coxal plates and tergites.

Distribution. Europe; Califormia; Niagara (Canada). This species has not been recorled from N. America since Stuxberg (1875), on which Budde-Lund (1885) comments, "quid mihi minus verisimile videtur."

Figured in full by Sars (1899).
I have included $L$. cursorium lBudde-Land and L. melanocephala Koch as synonyms of this species after a minute examination of the original specimens. Verhoeff rightly conjectures that $L$. cursorium is a large variety of L. hypnorum, and as such I have distinguished it. L. melanocephala is a colom variety, with slight structural features to separate it from $L$. hypmorum. I agree with Verhoeff that L. amethystium is almost certainly a. synonym.

Tarieties.
L. hypnorum, var. cursorium (Budde-Lund). Length 9 mm . Breadth 4 mm. Frontal margin sinuate, median $V$ blunt and slightly produced. Frontal grooves shallow. Colouring as in L. hypuortem. Inner process of moporl base perhaps a little shorter than in $L$. hypnorum.
L. hypnorum var. atromaculatum Verh. The dark markings make 2 longitudinal bands on the tail in front of the telson.
L. hypmorum var, melanocephata (Koch). Body very convex alove; antennal flagellum 9-12 segments; fourth segment of antenna scarcely longer than the third; colour predominantly dark hrown.

## 2. Ligidium fragile Budde-Limal. ('Text-fig. 5.)

Ligidium fragile Budde-Land (1885), p. 257.
Ligidium euxinum Verhoeff (1918), p. 114.
Length 7.5 mm . Breadth 3.5 mm .
Surface smooth and shining. Head. Frontal margin sinuate; median V moderately sharp; not produced. Transverse groove deep and narrow, and passing behind eyes; frontal groove very shallow and joining transverse groove abruptly. Eyes large and pear-shaped. Thorax. 1st somite with lateral depression on each


Ligidium fragite. $a$, antema; $b$, head from front.
side extending to hind border. On hind border of depression a bristle group. Coxal plates: sutures faintly marked on last four somites; slightly drawn backwards on last three somites. Antenual thagelluni reaching back as far as halfway across 3rl thoracic somite ; with $12-15$ segments. Uropods. Inner process of base nearly as long as base; endopods reaching further back than exopod; exopod about twice as long as inner process. (I have not seen a complete uropod.) T'elson. Sides obtuse-angled and with slight notch over uropols.

Colour. Mottled brown and yellow; median yellow stripe from head to tail; legs yellow.

Distribution. Ciucasia, Crimea.
Verhoeff"s suspieion that his $L$. emxinum can be brought into relation with Budde-Lund's $L$. fragile proves to be well foundell on further examination of Budde-Lund's material. I have no hesitation in placing it as a synonym of that species.

P'ariety.-L. fragile caucasium Verhoeft' (1918). Epimera of thomx predominantly colomed with irregular brown marks. Hind angle of tergite of 2nd somite with similar depressions to 1st tergite. Antenaal flagellum with 11 segments.
3. Liehdium grachin (Dama). (Text-fig. (i.)

Styloniscus !fracilis Dana (1856), p. 176.
Liupitium tcrue Budde-Lami (1885), p. 258.
Liyitiumn gracilis Holmes(1904), p. 318; Richardson (190:), p. 690 (q.v. for other references).

Liigidium gracile Verhoeft (1918), p. 114.
Lenylh : of 7 mm ., of 9 mm . Jirealth : $\delta 2 \mathrm{~mm}$., of 3 mm .
Siurficte smooth and shining. Ifead. Frontal margin sinuate; median V shaply drawn out and produced to slight rostrinn. Tramsverse groove deep and short, reaching to imner elge of eyes. Frontal grooves obsolete or very faintly indicated. Eyes; rather small and somewhat pear-shaped. Thorax. lst somite finished with lristles at regular intervals on lateral elges, none on posterior margis. A deep lateral depression on each sile reaching hind border. No bristle group. Coxal-plate sutures distinctly marked on last form somites in both sexes; dhawn backwarts on last three, somites only, the 5th somite little if at, all drawn back. Auteranal flagellum reaching back to lime margin of 2 nd somite'; with 12 segments. Uropols. Tnner process of base stout, slightly curved and about half as loug as base. Rndopol by itself slightly longer thin exopol ; combinell with inner process exceeds exoporl ly about one-sixth of the latier. Rxopol about fonr times as long as inner process. T'elson with blunt postero-lateral angles moderately ileeply notehel over uropods.

Pleopods of d $^{\prime}$. 1st exopod with one long hristle ; 1st enlopol with process moderately drawn-out and blunt, with ä bristles; 2nd endopord with small rounded lappet.

Colour. Brown ground; brown median stripe; mottled on each side with yellow. Yellow stripe along and above sutures of coxal plates, which are brown on each side. Legs yellow. Heand mottlen.

Instribution. California, St. Clara ; Massett (British Colmmbia). Sitkal Island. San Franeiseo.

The specimens in Budde-Lund's colleetion that he has identifieel with L. gracile Dina are from St. Clara (California). They
differ in slight particulars from Holmes's (1904) description of Dana's material ; the anteme (judging by Holmes's imperfect figure) are shorter, but as Dana's specimens are larger than these, the point is not of much systematic value; the eyes of Dana's specimens are described as "rather large"-a verbal difference depending on an unknown standard. These specimens have smaller eyes than the average in Ligirlium. There cannot be much doubt that they are the same, however.
'Text-figure 6.


Ligidium gracile. $a$, antemma; $b$, head from front; $c$, 1st tergite, lateral elge; $d, c \& f$, 1st and 2nd pleopods of $\delta ; g$, urepod from below.

The specimens from British Columbia are labelled with an unpublished name by Budde-Lund. They are, however, specifically identical with L. gracile, but have interesting differences that entitle them to rank as a variety. Melanin pigment is entirely absent, and the eyes are slightly smaller. I have no
history to these specimens, but one may sumise that they are cave varieties of $\bar{L}$. gracile.

Budde-Sund (1885) described from Sitka Island a species, L. tenue, but the only important points in his description the the detail of the uropods and the size. These agree closely enough with L. gracile to justify a provisional inchasion of the species in the synonymy of $L$. gracile, but I have seen no specimens.

Fignes in Richardson (1905).
Pariety:-L. gracile var. flauram, n. var. Pigment entirely absent. Eyes rather small, round, and not reaching to lateral margin of head.

## 4. Litgidium hatum, sp. 11. ('lext-figs. 7 \& 8.)

Lentll: of 6 mm ., 号 8.5 mm . Dreadlh: of 3 mm , +4 mm .
Surface rough and covered with small seales. Mecul. Frontal margin simate; median $V$ very sharp and prolucel. 'Transverse groove deep and passing behind eyes; frontal grooves very deep' and curving back to join transverse groove abruptly. Lyes large and pear-shaped. Thorax. lst somite withont lateral depressions or bristle gronps. Sete at intervals on lateral border, but absent on posterior border. Coxal-plate sutmes well marked on last. four somites in the female, only lightly marked on last two in male; well drawn backwards on last three somites and slightly on fourth somite. Autennal flagellum long, reaching back as

Text-figure 7.


Ligidium latum. $a$, last four thoracie somites from left side; $l$, head from above.
far as hind margin of 4th somite; with 12 segments. Uropods. Tuner process of base shorter than base by about half its length, stont and conical. (None of my specimens have madamaged moporls.) The single seta arising from outer sirle of base, set on sharp and pointed process. Telson deeply notehed over uroporls ; blmat, rounded postero-lateral angles.
l'leopods of $\delta \delta$. 1st exopod with one (?) .bristle; 1st endoporl with moderate process and one (?) bristle; 2nd endopod ending in pointed process.

Colow. Brown and yellow mottled; slightly lighter streak down middle of back. Coxal plates light and sharply defined
from brown of tergite at the suture. Legs banded with yellow and brown.

Distribution. San Francisco.

## Text-figure 8.



Ligidium latum. a, heal from front; $b$, lst tergite, lateral edge ; $c$ \& $d$, endopod ${ }^{\circ}$ of 1 st and 2 ud pleopods, $\delta$; $e$, uropod from below.

- This species is distinguished from all but L. noclulosum by its very distinctive rough surface. It differs from that species in the character of the granulations and the form of the lst somite.


## 5. Ligidium gemmanicum Verhoeff. (Text-fig. 9.)

Ligidiun yermanicum Verhoeff (1901), p. 41 ; Verboeff (1918), p. 114.

Ligidium herzegowinense Verhoeff (1918), p. 114 ; Dahl (1916 \& 1917).

Length 7 mm . Breadth 2.5 mm .
Surface smooth and shining. Head. Frontal margin slightly sinuate, median $V$ almost obsolete, not produced. Transverse groove deep and passing behind eyes; frontal grooves shallow and curvel, passing into transverse groove at less than a right angle. Eyes large and pear-shaped. Thorax. 1st somite without lateral depressions or bristle groups. Coxal plates: sutures
faintly visible on last three somites of male, very faint or obsolete on female; lime corners of last three but litile drawn ont. Autemal flagellum reaching lack as far as halfway across 3 rl somite ; stout and somewlat setose; with $9-10$ segments. Uropods. Inmer process of base curved and longer than hase. Endopod by itself about as long as exopod; combined with imer. process exceeding exopod by about one-thind of the latter. Exopod about twice as long as imer process; setie of endoporl


Sigidiun germanicum. a, head from front; $b$, antema; $c$, wropol from below.
about three-quarters as long as that branch. Telson arcuate, inclining to a bluntly angulate condition in some; no noteh above uroporls.

Pleopods of $\overline{0}$. Similar to L. hypnorum.
Colour. Predominantly brown, mottled with yellow; legs yellow.

Distribution. Cential Europe.
6. Ligidium japonicum Verhoeff. (Text-fig. 10.)

Ligidium japonicum Verhoeff (1918), p. 114.
Length 6 mm . Brealth 2.5 mm .
Surface smooth and shining. Ifad. Frontal margin sinuate. forming moderately sharp $V$; not produced. 'Lransverse groove narrow and deep, and passing behind eyes. Frontal grooves shallow, joining transverse grooves abruptly. Eyes large and pear-shaped. Thorax. lst somite with deep lateral depressions; no bristle groups, but a group of little processes lies in each depression. Coxal plates : sutures not visible; hind corners of last three slightly drawn out. Antenncel flagellum reaching as far back as hind margin of 3rd thoracie somite; with 14 segments; long and setose. Uropods. Inner process of base short and blunt, hardly one-third base and shorter than width of base. Endopod by itself about lialf as long again as exopod, combined with inner process nearly two-thirds as long again. Exopod about six times as long as inner process. Teelson. Only slightly notched above mopod; no postero-lateral production.

Pleopods of $\sigma$. 1st exopod with 5-6 large setre; 1st endopod drawn out internally into sharp triangular process with 5-6 large sete; 2nd exopod "divided very distinctly by a suture in two parts" (Verhoeff); 2nd endoporl with small rounded projecting terminal lappet and three small spines on imer erge at distal end.

Text-figure 10.


Ligidinm japonicum. $a$, head from front; $h$, antemat ; $c \& d$, endopod of 1st and end pleopods, $\delta ;$ e, uropod from below.

Colour. Light brown with whitish speckling: longitudinal band of large spots over coxal plates; median brown loand withont mottling ; legs whitish.

Distrilution. Japan; "Moheri" (Japan).
Figured by Verhoeff (1916).

I have not seen specimens of the following species:-
7. Lieidium bosniense Verhoeff.

Ligidium bosniense Verhoeff (1901), p. 40 ; (1918), p. 114.
Distribution. Sarajevo, Bosnia.
Brielly described but not figured.

## 8. Ligidimm nodulosum Verhoeff.

Ligidiam nodulosum Verhoetr (1918), p. 114.
Distribution. Cancasus.
Deseriberl with fignres by Verhoeft.
Proc. Zuol. Soc.-1923, No. IN.
9. Ligidium longicaudatum Stollei.

Ligiclium longicaulctum Stoller (1902), p. 208; Richardson (1905), p. 688 ; Verhoeff (1918), p. 114.

Distribution. New York.
Verhoeff remarks of this species that the figure given by Stoller can scarcely be accepter. The descriptions are also inadequate, and the specimens should be redescribed in the light of recent work.
10. Ligidium ('T'ypuloligidium) ceecum (Carl).

Liyidium cecum Carl (1905), p. 327.
Typhloligidium cucum Verhoeff (1918), p. 114.
Distribution. Crimea, in caves.
Verhoeff supplements Carl's description, but no new figures have been given. Carl figures the telson and mopools and the second pleopod of the male.

I wish to acknowlerlge my debt to Dr. W. T. Calman, T.R.S., for allowing me the use of the British Museum material, and for his readiness in advising on questions of Crustacean morphology and literature.

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[^0]:    * This paper is the second of a series.

